# HOW TO TAKE

# STEREOSCOPIC PICTURES,

INCLUDING A

Detailed Account of the Necessary Apparatus,

AND

A MINUTE DESCRIPTION OF A

MODIFIED

## COLLODIO-ALBUMEN PROCESS.

By WILLIAM ACKLAND.

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# HOW TO TAKE

# STEREOSCOPIC PICTURES.

## ON BINOCULAR VISION AND THE STEREOSCOPE.

The study of Binocular Vision is one of the most fascinating branches of Optics, and has long afforded ample scope for the theorist, but the practical application of its principles is only of recent date. It is a fact but little known, though indisputable, that if a solid object is viewed with both eyes, or with each eye in succession, the image of that object formed on one retina is quite different from that which is formed upon the other; yet these two dissimilar pictures, united, give to the mind the impression of a solid, having rotundity, depth, and thickness.

Now, as we find that such a result is caused by the impression of the two different pictures on the retina, we are led to inquire what would be the effect of reversing the process; so that, instead of viewing one solid object, and impressing the retinæ with two dissimilar pictures, we viewed two dissimilar pictures of the same object, and united, by squinting, the images formed on the retinæ. This experiment has been made, and it is proved that the combined pictures will give the appearance of a solid in relief, having all the usual characteristics of one,—namely, rotundity, depth, and thickness.

The two dissimilar pictures of the same object may be united

with much greater facility by being viewed in the Stereoscope, as this instrument renders the illusion more perfect.

The original Stereoscope, as first introduced by Professor Wheatstone, consists of two parallel mirrors placed with their edges in contact, and inclined at right angles one to the other. These mirrors are attached to a vertical support which slides into the centre of a base-board, about three feet long. Near the two ends of this base-board are supports for receiving the pictures, which are so placed that they shall face each other. On looking into the two mirrors at the same time, the images of the two pictures are formed on the same portion of each retina, conveying to the mind an impression of an object in relief.

This form of Stereoscope is adapted for viewing large pictures, but is not so successful when applied to small ones of two or three inches square.

For viewing small stereoscopic pictures, the Refracting Stereoscope, invented by Sir David Brewster, is more useful. This deservedly popular instrument, now so generally known, consists of a pyramidal body of wood about $5\frac{1}{2}$ inches high, surmounted at the top by two eye-pieces, separated from each other a distance equal to the space between the two eyes (about $2\frac{5}{8}$ inches). Each of these eye-pieces contains the half of a lens, about 6 inches focus. The body of the Stereoscope is pierced near the base to form a receptacle for the picture to be viewed; and a small door in front, when opened, admits the passage of light to illuminate opaque pictures.

If we take two correct drawings of any object from two different points of view, and place them in the Stereoscope, we shall find, on looking through the instrument, that the two plane representations inserted within will appear united, forming one solid representation of the most perfect description. But this truly wonderful result cannot be obtained, unless the drawings are exact copies of nature, more exact than the human hand can execute; therefore we call another science to our aid, and have recourse to sun-pictures.

Photography enables us to obtain with great facility the most truthful pictures, correct in every detail and perfect in every

shade, whether portraits, groups, studies, or views; and these are rendered more life-like when viewed in relief by the aid of the Stereoscope, thus making the illusion so complete as to astonish the beholder.

To describe plainly and practically the mode of producing such representations by Photography has been my aim in this treatise. If the reader finds from my directions as much gratification as I have obtained whilst preparing them, I shall be fully rewarded.

In order to produce pictures by Photography, certain apparatus is indispensable, but I propose describing only what is needed to produce pictures suitable for being viewed by the Refracting Stereoscope, my reasons for this limitation being:—

1st.—That double pictures seen in the Stereoscope convey to an observer a more pleasing and correct impression than could possibly be derived from viewing a single picture, although treble the size.

2nd.—The bulk of the apparatus necessary for stereoscopic pictures is more easy of transport than that for taking single pictures of a moderately large size. Indeed, all that is required for taking six stereoscopic views may be carried without much inconvenience for miles, as the weight does not exceed ten pounds, whereas the weight of the necessary apparatus to take single views of even seven inches by six would be at least one-half more.

The apparatus necessary for taking stereoscopic pictures consists of

1. Camera.
2. Lens.
3. Camera Stand and Screw.
4. Focussing Eye-piece.
5. View Meter.
6. Focussing Cloth.
7. Spirit Level.

The whole of these are included in the "Box Camera," described at page 11.

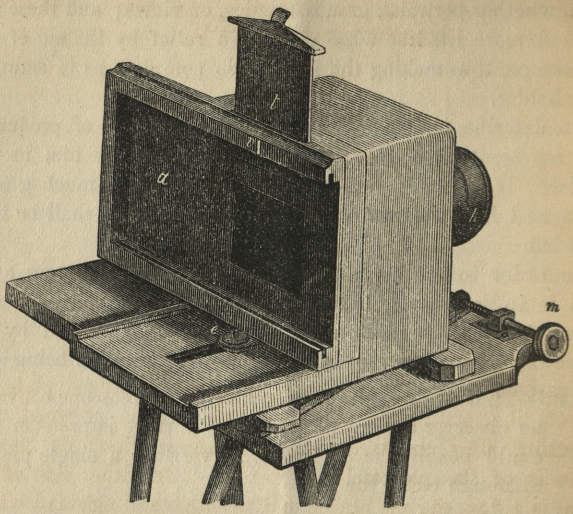


Fig. 1.

THE STEREOSCOPIC CAMERA.

A Camera adapted for taking stereoscopic pictures is represented by Fig. 1, the body of which is of the form commonly used for taking portraits; but the receptacle *a*, to receive the

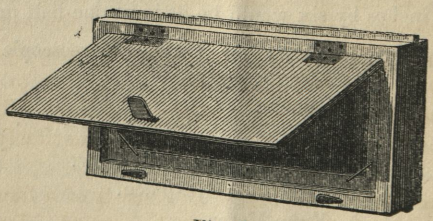

Fig. 2.

camera-back (Fig. 2), is placed horizontally when in use. The camera is fixed on the cross bar *c* of the base-board (Fig. 3). This cross bar connects two parallel bars *b b*, which are capable of adjustment by the right and left handed screw *e e*. The

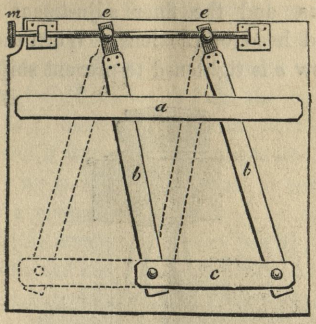


Fig. 3.

camera-back (Fig. 2) serves to receive the sensitized plate, and protects it from light. It consists of a frame of wood, with projecting slips on its two longest edges, which fit into the channels of the receptacle *a* (Fig. 1). On either side of this frame is a flap, the one hinged and the other sliding; and within, a frame with silver wire corners. The sensitive plate is placed in this camera-back by raising the hinged flap, and allowing the plate to drop in, so that *the sensitive surface rests on the silver wires*. The hinged flap is then closed, and the brass buttons turned, to prevent it again opening. If we intend conveying it to a distance before exposing in the camera, it is advisable to secure the sliding flap from being accidentally opened, by passing a vulcanised band around the camera-back. This band must, of necessity, be removed when the back is placed in the camera; but it is a wise precaution to replace it as soon as possible, for the slightest gleam of light falling on the plate, either before or after exposure, would inevitably spoil the result.

The Focussing Screen (Fig. 8, *d*) consists of a frame of wood containing a plate of glass very finely ground. Its use is to ascertain when a proper focus is obtained. This screen should have a vertical pencil line ruled on it to serve as a guide in adjusting the bars *b b* (Fig. 3). The camera admits of being expanded on the screw *e* being loosened, in order to get an

approximate focus, and the finer adjustment is obtained by turning the milled head of the lens. When the proper focus is obtained, the screw *e* is tightened to prevent shifting.

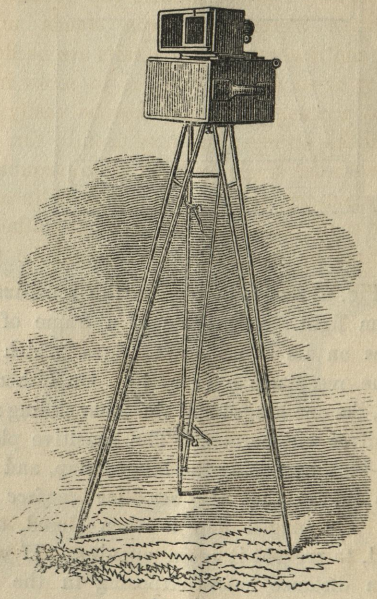

Fig. 4.

### THE CAMERA-STAND

Consists of a brass top, and six legs jointed near to the bottom so as to form three pairs. The legs, when not in use, fold closely, and are strapped together for more ready transport.

The camera is fixed on the camera-stand by passing the screw *f* (Fig. 8) upwards through the hole in the stand-top, and then screwing it firmly into the nut fixed in the centre of the base-board.

### STEREOSCOPIC LENS.

In order to take stereoscopic views effectually, a single achromatic lens must be employed, the focus of which does not

exceed 4½ inches. A short focus portrait lens, even when used with a small diaphragm, does not produce such good results, and after trying a number of experiments with a great variety of lenses of different foci, I am led to form the opinion that Horne and Thornthwaite's Stereoscopic Lens stands unrivalled for taking views;* and if stereoscopic portraits are needed, a portrait combination may be so fitted into it as to screw into the same flange, and thus a change of lenses may be easily made. The tourist will find this arrangement very useful; for, after taking various scenes with the single lens, he may encounter the rustic peasantry of the country, and wish to fix their lineaments on the plate, which he could not accomplish with any other. The time of sitting required by the single lens would be too long and tedious, and here the double, or portrait combination, would be found useful.

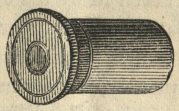

Fig. 5.

FOCUSSING EYE-PIECE.

This little instrument (Fig. 5) is used in order to assist the sight in focussing, as described in the section on that subject.

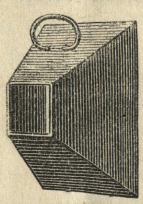

Fig. 6.

THE VIEW-METER.

* Horne and Thornthwaite have lately introduced a *Large Angle* Stereoscopic Lens of 3¾ inch focus, which is peculiarly adapted for taking views of buildings, &c., in confined situations, as by its aid the camera may be placed much nearer the object than could be possible with a lens of longer focus.

### VIEW-METER.

This useful appendage to the photographic outfit consists of a conical-shaped box, open at either end, as represented by Fig. 6. If held by the ring, so that the smaller end is near the eye, on looking through it the larger end will expose just as much of the view as the camera will take in, if placed in the same situation.

The exact position where to "set-up" the camera is easily determined, and the selection of the best point of view readily made by its aid. For this important reason, the little instrument should always occupy a place in the amateur's pocket when on a ramble, as, although he may not be then out for photographic purposes, he may wish to ascertain the fitness of a particular point of view at which, on some future time, to plant his camera, or to ascertain whether or not the view before him is suitable, and how much could be taken in by his camera.

It may be noticed that the view-meter is required to be constructed to suit the focal length of the lens employed, and of the picture produced; consequently, a view-meter constructed for one lens will not answer for another of a different focal length.

### FOCUSSING CLOTH.

A focussing cloth is absolutely essential, and is usually formed of a square yard of black cotton velvet. Its use is described in the section on focussing.

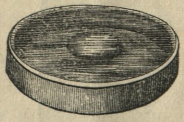

Fig. 7.

### CIRCULAR SPIRIT-LEVEL.

It is a point of some importance, when taking views, that the camera should be perfectly level. This is easily effected by placing a circular spirit-level (fig. 7) on the camera, and moving the camera-stand legs, until the spirit-bubble is exactly in the centre of the level.

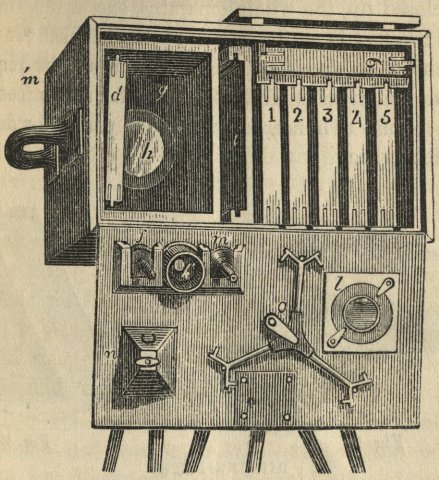


Fig. 8.

THE STEREOSCOPIC BOX-CAMERA.

This is a much more convenient form of camera than the one previously described (p. 6), and is such as can be strongly recommended for its portability, lightness, and ease of manipulation; as, within a space of eleven inches long, six inches wide, and nine inches deep, are contained the camera, lens, focussing screen, six camera-backs, tangent-screw, screw-nut, view-meter, focussing eye-piece, focussing cloth, and spirit-level.

This box-camera is represented open by Fig. 8, and arranged for use by Figs. 4 and 15. Fig. 8, *g*, represents the camera; *h*, the lens; *i*, the back holder; *d*, the focussing screen; Nos. 1 to 6 the camera-backs, each capable of receiving a prepared plate; *k*, the focussing eye-piece; *f*, the screw to attach the camera to the stand; *l*, spirit-level; *m* the handle by which the adjusting screw (*e*, *e*, fig. 3) is turned. The screw in this camera is placed inside the box, to protect it from injury. On the right hand side of the box is a small hole, into which the handle *m* is pushed, so that it may fit on to the end of the screw; *n*, is the view-meter; and *o*, the top of the camera-stand.

When closed up, the whole apparatus, except the "legs," pack inside, and the box is easily carried by the handle.

In addition to the foregoing, which would be required for out-door use, the articles which follow as far as the foot of p. 14, are needed for use at home, to prepare the plates, for developing, fixing, exciting, &c.

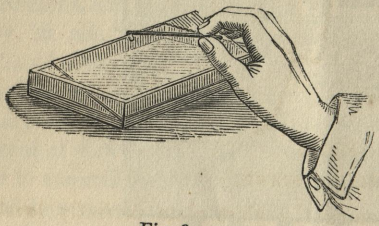

Fig. 9.

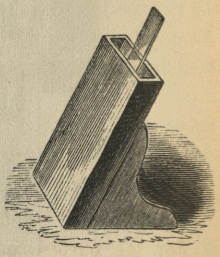

Fig. 10.

DIPPING-BATH.

The dipping-bath is employed for exciting the plates in the bath-solution, and may be either horizontal or vertical. The horizontal bath consists of a glass tray, with upright sides (Fig. 9), and is usually a trifle larger inside than the plate to be excited. A silver hook is to be used with this bath, in order to lower and raise the plate in and out of the solution.

The horizontal bath is the most convenient for rendering the plate sensitive during travelling, as it requires a very small quantity of bath-solution to excite a plate.

The vertical dipping-bath is used to excite the collodion film, and is represented by Fig. 10; the bath is generally made of gutta-percha, and the dipper of glass.

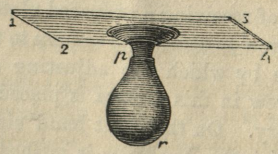


Fig. 11.

PLATE-HOLDER.

The most convenient form of a plate-holder is represented by Fig. 11. It is fixed to, and serves as a handle for, the plate during the coating.

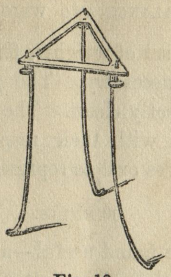

Fig. 12.

LEVELLING STAND.

For the purpose of keeping the glass plate perfectly level during washing and developing, a levelling stand is employed, such as Fig. 12. In order to set it level, a glass plate, supporting a circular level, Fig. 7, is placed on the top, so as to rest on the screws; and one or more of the screws is raised or depressed, until the spirit-bubble is exactly in the centre—thus indicating that the glass plate is perfectly horizontal.

GLASS ROD.

A glass rod is very useful to stir up any substance resting at the bottom of a liquid in which it is to be dissolved, and for mixing together two or more solutions, to ensure a perfect admixture. Very great care must be used to keep it perfectly clean, or solutions stirred with it may become contaminated and useless.

GRADUATED GLASS MEASURE.

For the purpose of measuring quantities of solution, a two-ounce graduated measure is required. This is divided on one side into sixteen drachms, and the other into two ounces. In using it, hold it up level with the eye, and pour in the liquid until it rises to the mark indicating the required quantity.

CLOTHS.

Two carefully-washed cloths of "fine diaper" are required to

clean the glass plates, measures, &c., and a third, of common material, to wipe the hands, or dry up any liquid that may be spilt.

### BALANCE AND WEIGHTS.

A balance, with a set of weights, for weighing out the quantities of chemicals, is necessary. The pans should be of glass, and must be kept perfectly clean. The large weights, up to two drachms, are stamped with their respective weights, and the smaller ones have figures or dots representing grains.

### FUNNELS.

Two funnels will be found useful—a small one of glass, and a larger one of gutta-percha. The latter should be so made that the small one will fit inside it, thus economising space, and preventing fracture during travelling.

### FILTERING PAPER.

This can be obtained either ready cut into circles to fit the funnel, or in quires. Two sizes of circular filters will be needed, and about half a quire of filtering paper.

### DEVELOPING GLASSES.

A set of three developing glasses, the largest of which contains about two ounces, will be found very useful.

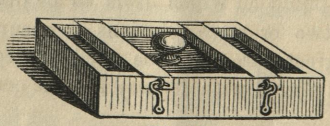

Fig 13.

### PRESSURE FRAME.

For the purpose of reproducing transparent positive pictures from glass negatives, a pressure frame of the form of Fig. 13 will be required.

Having given a description of the apparatus necessary for taking stereoscopic pictures, the next step will be to determine what process we shall adopt in order to ensure success in our photographic

attempts, and our selection must be guided by the fact, that the operations may frequently take place at a distance from our usual working room.

Passing over the Daguerreotype process as too troublesome, and the Calotype wax-paper processes as not giving the minute detail required, we have three processes left to select from, viz., the COLLODION, ALBUMEN, and COLLODIO-ALBUMEN.

### THE COLLODION PROCESS

Requires but a very short exposure, and is therefore more available for stereoscopic portraits, where all other processes would fail; but as the sensibility of the film is lost when once allowed to become dry, it is useless for portraying views, except those close at home. To remedy this evil, it has been proposed to cover the sensitive film with some hygrometric substance, such as honey or oxymel. This plan has succeeded to some extent, but the varying sensibility of the prepared plates, and the tenderness of the film, renders such plans scarcely available for our purpose. Some operators take a tent in which to conduct their operations; but such bulky apparatus do not recommend themselves, as the results scarcely repay the labour bestowed, and, besides, even with all this cumbersome paraphernalia, the uncertainty of the collodion process is ever present, and often to the total failure of all attempts to produce a picture. Every operator is quite aware that with the same chemicals and apparatus that just yielded good pictures, scarcely a vestige may be obtained, and this sudden change will result from no apparent cause.

### THE ALBUMEN PROCESS

Is universally acknowledged to produce very fine results with a great degree of certainty, but unfortunately the care necessary to prepare the plates *free from dust, and with a uniform coating*, is so great that few amateurs succeed, as a properly constructed room, in which to conduct the operation, is absolutely essential. The length of time required for the exposure of the albumen plate in the camera is another serious objection to this process.

## THE COLLODIO-ALBUMEN PROCESS

Possesses nearly all the combined advantages of the foregoing, without the disadvantages. The plates are easily prepared, and when albumenised can be kept an indefinite time; and even when excited, the exposure and development may with safety be delayed for two or three weeks.

The time of exposure in the camera may be considerably varied, as an exposure of even double or treble the required time does not affect the result; indeed, all that is necessary is to study the time required to bring out the details of the deepest shades, and no fear of over-exposure need be entertained. The collodio-albumen process, as introduced by Dr. Taupenot, was liable to many serious objections, which even the talent of the inventor failed to overcome; the most prominent of which were, blistering of the film, and a yellowish brown colour of the negative, which interfered greatly with the process of printing. These objections are now entirely removed, without affecting the beauty of the process in the slightest degree. These important advantages over the others induce us to give preference to the collodio-albumen process, and we therefore proceed with the description of it, merely premising that although our remarks will be confined to the production of small pictures, there will be found no difficulty in applying this process to those of larger sizes.

Before entering into a description of the manipulations, I propose to give directions for preparing the various solutions. These solutions are—

Cleansing Mixture.
Tincture of Iodine.
Iodized Collodion.
Iodized Albumen.
Bath Solution.
Gallic Acid Solution.
Silver Developing Solution.
Fixing Solution.

CLEANSING MIXTURE.

| | |
|---|---|
| Tripoli - - - - - | 4 drachms. |
| Cyanide Potassium - - - | 2 ,, |
| Filtered Water - - - | 4 ounces. |

Dissolve the cyanide of potassium in the water, then add the tripoli, and shake well together until perfectly mixed.

N.B.—*This solution is poisonous, and must therefore be used with caution.*

TINCTURE OF IODINE.

| | |
|---|---|
| Iodine - - - - - | 1 drachm |
| Alcohol - - - - - | 1 ounce. |

Mix.

IODIZED COLLODION.

The collodion necessary for this purpose must be such as, when poured on a plate of glass, yields a transparent and slightly coherent film, which does not admit of being lifted entire from the glass, and having a roughened surface when viewed microscopically. These properties are not possessed by collodion recently iodized; but good negative collodion, after being iodized as described below, will answer the purpose: it may be used if it has been iodized for months.

In order to iodize collodion for use in this process, add two drachms of negative iodizing solution, ten drops of tincture of iodine, and ten drops of glycerine, to six drachms of negative collodion; shake well together, and then allow the bottle to remain undisturbed for at least one hour, in order that any insoluble particles may settle to the bottom; then pour off the clear portion into a clean and perfectly dry bottle for use.

In operating with this volatile article, never approach with a light near the open bottle, or accident may arise from its inflammable character.

It is not deemed necessary or advisable to publish the formulæ for the manufacture of collodion and its iodized compound, as these manipulations are seldom attended with success when attempted by any but experienced chemists; the amateur is therefore recommended to purchase these articles ready prepared of the photographic chemist.

### IODIZED ALBUMEN.

After trying various experiments on the best formulæ for this liquid, I am led to conclude that none exceeds the following:—Take three eggs and carefully separate the yolk and germ; pour the white into a measure, which will give about eighteen drachms of albumen. Add to this six drops of glacial acetic acid, and stir the whole together for two minutes with a glass rod, then leave it to rest for *one hour*.

Now slightly plug the neck of a clean glass funnel with a fragment of sponge, and pass through it a few drops of distilled water to moisten it. Next place on the sponge one scruple of iodide of ammonium, and on the top of it pour the now semi-coagulated albumen, and two drachms, by measure, of treacle: this passes readily through, dissolving in its passage the iodide of ammonium in the filter.

The result from this preparation should be *perfectly limpid;* if such is not the case, press the sponge more tightly into the neck of the funnel, and filter till it is so, as *germ* on the plate is still worse than dust.

### BATH SOLUTION.

| | |
|---|---|
| Nitrate of Silver, fused - - | 10 drachms. |
| Kaolin - - - - - | 3 ,, |
| Iodide of Ammonium - - | 6 grains. |
| Glacial Acetic Acid - - - | ½ ounce. |
| Distilled or Filtered Rain Water | 16 ounces. |

Dissolve the nitrate of silver in four ounces of the water, and add to it the iodide of ammonium; shake well together, then add the remainder of the water, and filter to separate the yellow precipitate which is formed. Then to the clear solution add the kaolin and acetic acid.

### GALLIC ACID SOLUTION.

| | |
|---|---|
| Gallic Acid - - - - | 1 scruple. |
| Filtered Rain or Distilled Water | 4 ounces. |

Place the gallic acid in the water, shake frequently, and keep the bottle in a warm situation for some hours, so that the water may dissolve as much as possible; then remove any that remains by filtering just prior to using the solution.

SILVER DEVELOPING SOLUTION.

| | |
|---|---|
| Nitrate of Silver - - - | 1 scruple. |
| Glacial Acetic Acid - - - | 20 drops. |
| Distilled or Rain Water - - | 4 ounces. |

Dissolve the nitrate of silver in the water, then add the acetic acid, and filter for use.

FIXING SOLUTION.

| | |
|---|---|
| Cyanide of Potassium - - | 10 grains. |
| Water - - - - - | 4 ounces. |

Dissolve and keep in a closely-stoppered bottle for use.

N.B.—*This solution is poisonous.*

For the benefit of the non-chemical reader, we will point out the keeping qualities of these solutions:—

The cleansing mixture, tincture of iodine, iodized collodion, silver developing solution, and fixing solution, will keep good any length of time.

The gallic acid and iodized albumen solutions cannot be depended on if they have been made longer than four days.

The bath solution does not change by keeping, but requires the addition of ten grains of nitrate of silver to each ounce, after being used to excite about forty plates; and if it becomes brown, the addition of a little more kaolin will remedy the defect.

Fig. 14.

FILTRATION.

Filtering is an operation that requires to be done at almost every step in photographic manipulation, in order to separate any floating or insoluble particles from solutions, and is performed as follows:—A circular piece of filtering paper is folded in half twice, so as to form, when opened, a paper cone, as shown in fig. 14; this is placed within a glass or porcelain funnel, and a bottle or other glass vessel is placed underneath

the funnel to receive the filtered liquid. The solution to be filtered is poured in a gentle stream against the double side of the paper cone until the fluid rises to within a quarter of an inch of the upper edge. Immediately the paper cone becomes wetted, the liquid will percolate through, and drop into the vessel placed to receive it, becoming in most cases perfectly clear; but if such is not the case, allow the filtration to proceed for a few minutes, then return what has passed through the funnel to be again filtered a second time, or until it is quite free from any floating particles. As iodized albumen filters very slowly through, and soon clogs up the pores of filtering paper, a fragment of sponge, pressed lightly into the neck of a funnel, must be employed instead.

## THE OPERATING ROOM.

In order to prepare the collodio-albumen plates, and properly to develop the picture, an operating room is absolutely necessary. By this it is not meant that a room built expressly is needed, for almost any room can, in a few minutes, be made to serve our required wants, but the only absolute condition that must not be deviated from is, that no light shall enter the room except what passes through three thicknesses of yellow glazed calico. The most convenient room is one facing the north, and with one window only. Prevent any light passing in by the upper half of the window, by closing the shutters or covering it with any black material impervious to light, and cover the lower half with three thicknesses of yellow calico. Close the door, and carefully observe if any gleam of light enters the room, except what passes through the yellow calico; should any crevice be detected, it must be covered over, as the intrusion of white light through the smallest chink is often sufficient to spoil a picture, although light that passes through three thicknesses of yellow calico does not affect the picture, and affords sufficient illumination for all our operations.

A table placed close to the window, a gutta-percha tray to receive any liquid that may fall in developing, a good supply of cold water, a hand-basin, and a couple of linen cloths, complete all the requirements.

It will sometimes happen in travelling that a room may fall to our lot which would give us too much trouble to convert into one fit for the purpose. In that case our manipulation must be deferred until night, and an ordinary candle placed behind a double thickness of yellow calico may be our source of light.

### CLEANING THE PLATE.

To clean a new glass plate, pour a teaspoonful of the cleansing mixture over the centre of the plate, and with a pledget of linen well rub it over every part of back and front; then rinse it in a basin of cold water, or hold it under a tap so as to remove every particle of the mixture; next, without waiting for the plate to dry, remove all traces of moisture with a linen cloth, and polish with another linen cloth, holding the plate by the cloth and not by the hand, so as to prevent the slightest grease being communicated to it. The cloths employed should be of a material sold as "fine diaper," and must be well freed from grease or soap, by careful washing in soda and water, then plentifully rinsed in water and dried; also the one used as a polisher should be kept quite dry. Occasional breathing on the plate during the polishing, and then holding it obliquely, so that the moisture deposited may be seen by reflected light, will serve to point out whether a plate is clean or not. If the moisture of the breath is deposited in patches, more cleaning is required; but if the deposit is evenly spread over the whole surface, it may safely be considered as clean. Glass plates, after being once used, require to soak an hour in a solution of four ounces of common washing soda to one pint of water, so that the hardened albumen coating may be softened and easily rubbed off: they have then to be cleaned as before mentioned for new plates.

### COATING WITH IODIZED COLLODION.

Before proceeding to coat the plate, it is necessary that the iodized collodion should have been allowed to stand for an hour or more, so that any floating particles may fall to the bottom; and in all cases the dust and dried crust of the collodion which may adhere to the neck of the bottle must be carefully removed, otherwise spots or stains will be produced on the plate.

If particle of dust are floating in the air of the operating room, it will be useless to attempt to coat a plate, as they will deposit themselves on it and serve as a nucleus for a stain in the after-process. For this reason it is recommended to clean the plates in another room, so as not to disturb the atmosphere of the operating room from this cause.

Having ascertained that the glass plate is perfectly clean, grasp it firmly by applying the tips of the fingers and thumb of the left hand to the longest edge, then take the neck *p* of the plate-holder (fig. 11) between the first and second finger of the right hand; press the ball at *r* inwards with the thumb, and apply the concave part to the centre of the glass plate; remove the pressure of the thumb, and the plate will be found to adhere.*

When such is the case, transfer the ball to the left hand, and hold it so that the glass plate shall be horizontal; then remove the stopper from the iodized collodion bottle, and, holding it in the right hand, pour the collodion on the glass plate in sufficient quantity to form a circular pool extending to near the edges; next incline the plate so that the fluid may flow to corner No. 4, fig. 11, then to No. 3, then to No. 2, and drain the superfluous collodion back into the bottle by corner No. 1, holding the plate in a vertical direction. Give the plate a rocking motion on the neck of the bottle by very lightly raising and depressing corner No. 4, so that any lines or furrows which are formed may run into each other. Continue this until the covered surface of the plate appears set from the evaporation of the ether; when this takes place, compress the ball of the plate-holder and detach it from the plate. Now lay the plate collodion-side upwards on a glass dipper, and plunge it with *one downward movement* in the vertical bath (Fig. 10), filled to within an inch of the top with the bath solution, made as described at p. 18, and carefully filtered. After the plate has been allowed to remain in the bath one minute, it is lifted out two or three times, in order to facilitate the removal of the *oily appearance* which the plate now presents. When the surface appears uniformly wetted, the plate

* If the concave part *r* is slightly wetted with water, the adhesion to the plate is more perfect.

is removed from the dipper, and the excess of solution drained off; it is then placed, collodion-side upwards, on the levelling stand, (Fig. 12,) and a gentle stream of common water is poured over it, so as to remove *as much as possible of the bath solution* from the surface. The plate is now removed from the levelling stand, the back well washed with water, and then placed nearly upright on filtering paper, with the face against a wall, for *one minute*, to drain, and it is then ready to receive the albumen coating.

### COATING WITH ALBUMEN.

When the glass plate has been allowed to drain one minute, the plate-holder is again attached as before described, and iodized albumen is poured over the surface so as to cover every part; then drained off, *and again poured* on and off *three or four times;* ultimately, drain off as much as possible of the excess of the iodized albumen, and place the plate nearly upright against the wall, with the coated side inwards, to dry *spontaneously; as the albumen coating, if dried by artificial heat, becomes so hard that the plate is not fully acted on by the nitrate bath, and is consequently far less sensitive.* The iodized albumen must be filtered just prior to being used; one ounce will coat ten plates, and what remains should be thrown away, as it will have become too diluted to be effective.

In coating with albumen, the presence of air-bubbles or dust must be guarded against. The former can easily be done by taking care, in pouring the albumen into the measure and on the plate, not to pour so as to generate air-bubbles in the liquid. But should any be detected, hold the plate horizontally, and give it another coating of albumen, then incline the plate so that the bulk of the liquid shall pass over and carry off the bubbles with the running stream. Dust on the plate must be prevented by operating in a room as free from this photographic enemy as possible.

In order to render the coating of albumen as uniform as possible, the plate must stand to dry on two or three layers of filtering paper, and the upper surface must touch the wall at *one point only*, and not be allowed to rest against it along its entire upper edge.

When the albumen coating is *thoroughly dry* (and not till then), the plate is ready to be excited; but if more have been prepared than are likely to be used for taking pictures on during the next ten days or fortnight, they may be stowed away in a plate-box, ready to receive the sensitive coating at any time, as these albumenized plates will keep good for months and are not injured by light.

## EXCITING THE PLATE.

Prior to the plates being excited, they must be *thoroughly dry*, and free from any particles of loose dust on the surface, back, or edge. Sufficient of the bath solution is to be filtered through filtering paper to cover the bottom of the glass bath, Fig. 9, and rise up about the one-eighth of an inch.

The bath is now laid on the table of the operating room, with one of its longest sides next the operator, and the glass plate lowered so as to be immersed on its longest edge in the liquid; the silver hook is then applied to the upper edge (see fig. 9), and the glass plate is by its aid gradually, but steadily, immersed into the bath solution, as the least stoppage or hesitation will cause a stain which will appear during the development. Having carefully observed that no bubbles of air are underneath the plate, it is allowed to remain for one minute, then raised and depressed two or three times, and then removed. The superfluous liquid on its surface is allowed to drain back into the bath, and the plate is then placed on the levelling stand (albumen side uppermost), and a stream of water allowed to fall on its surface for half a minute, so as to thoroughly remove every particle of the bath solution. When the plate is thoroughly washed, it is leaned against the wall of the dark room to dry. The plate having been allowed to dry (which takes place in about half an hour), is ready for immediate exposure in the camera, or may be stowed away in a plate-box, and kept at least a fortnight before being exposed; and it is a fact worthy of note, that plates that have been sensitized a fortnight are equally as sensitive as those just excited.

The plates may be excited in the vertical bath, Fig. 10, exactly in the same manner as exciting the collodion film.

## EXPOSURE IN THE CAMERA.

As before stated, this operation may take place immediately the plate is thoroughly dry, after being excited; or a fortnight may intervene between the exciting and exposure, provided the plate be kept very carefully excluded from light and from any chemical or sulphurous vapours. Decidedly the best mode of preservation is a mahogany plate-box adapted for that purpose.* When the exposure is about to take place, or at any time previously, the camera-backs (Fig. 8) may each have an excited plate placed in them ready for exposure; to do this, the camera must be taken into the operating room, and the door closed so as to exclude all white light. One of the camera-backs is taken, the hinged

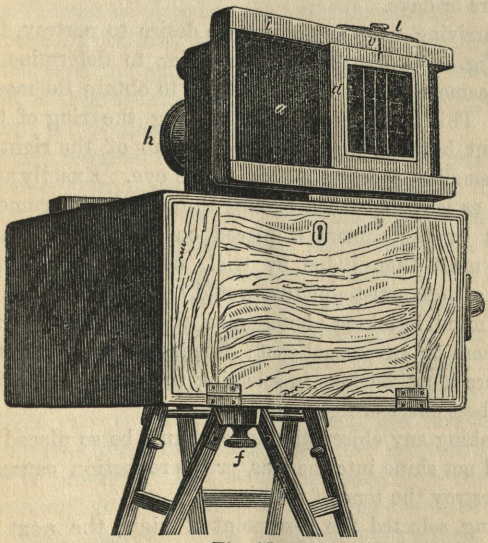


Fig. 15.

flap is opened, and the excited plate laid, albumen side *downwards*, or next the sliding flap, so that its corners may rest on the silver wire corners.

* The vapour given off by deal injures the sensitive plates. Boxes made from this wood must not, therefore, be used.

The hinged flap is now closed and kept from opening by turning the flap button over it; the sliding flap is examined to see that it is pushed closely down so as to prevent any light falling on the plate; and if the exposure is not to take place immediately, it is advisable to pass a stout vulcanized band around the back, to guard against the chance of either flap being accidentally opened. In exactly the same manner, an excited plate is placed in each camera-back, and when all are filled and the vulcanised bands passed around them, they are put into their respective places in the box. The whole is examined to see everything is in its place, the door is locked and the legs of the stand are buckled together, and all is ready for a trip which may take hours or days.

On arriving near any object we desire to portray, the view-meter (Fig. 6) is first employed, in order to determine on what spot the camera must be fixed in order to obtain the most artistic picture. This is easily done, by holding the ring of this little instrument between the finger and thumb of the right hand, so that the smallest aperture is close to the eye. Exactly as much of the view as is visible when looking through the instrument would be taken by the camera if placed on the same spot, and the operator must then judge by trial, whether by advancing or receding a more artistic picture would be produced. As it is to be borne in mind, in taking photographs, that it is not sufficient to fix up a camera on any casual spot; to ensure a good picture, something more must be done in selecting the proper situation to obtain the best effect of light and shade.

In taking any object, the camera must be so placed that the sun shall not shine into the lens, or the reflection caused thereby would destroy the tone of the picture.

Having selected the best point of view, the next step is to set up the camera-stand; this is done by unbuckling the legs, and having taken out the stand-top *o* (Fig. 8), take one pair of the legs, and push two opposing pins in the stand-top into corresponding holes of the top of the legs; then press down the stretcher to retain the legs in the position as shown by Fig. 4; proceed thus with the two remaining pair, and set up the stand so that

the legs are about three feet apart at the bottom: place the camera-box on the stand, and fix it firmly in that position by passing the screw from below through the hole in the stand-top, and then screw it into the nut inserted into the bottom of the box, as represented in Fig. 15. The camera *g* (Fig. 8) is then taken out and slid on to the dovetail on the top of the box, as shown by Fig. 15. The back-holder *i* is fixed into its place in the camera, and the focussing screen *d* in the groove in the camera-back, so that the mark on its upper edge shall correspond to a similar mark on the upper part of the back-holder; the cap of the lens is removed and the flap *t* drawn up: when this has been done, the apparatus is ready for focussing; but, prior to doing so, the circular level (Fig. 7) must be placed on the top of the camera, to ascertain if it has been set perfectly level. This is at once apparent, for if such is the case, the spirit-bubble will be in the centre of the level; and if it is not so, one or other of the stand-legs must be shifted until the desired position is obtained.

Focussing requires some care, and should be practised frequently before attempting to take a view at a distance from home. To do this, fix the camera on the camera-stand, with the lens pointed to some prominent object, and remove the lens-cap, placing the focussing screen in its place, as shown at Fig. 15. Draw up the flap *t*, and an inverted picture of all objects in front of the camera will be visible on the ground glass. In order to render this picture as sharp and perfect as possible, throw the focussing cloth over the head and back of the camera, so as to shut out all light except what enters the lens, and turn the milled head of the lens forward or back, until the greatest amount of sharpness is produced; but as the unassisted eye can scarcely discern with sufficient exactness, the focussing eye-piece (Fig. 5) is placed with its narrow end on the ground glass, and the magnified picture inspected by looking into the other end, the milled head of the lens being turned as before described, until the greatest possible sharpness of the picture is produced.

Should there appear too much foreground in the picture, loosen the screw in front of the camera, and raise the slide which carries the lens; and if there is too much sky, depress it, *but in no case should*

*the camera be either elevated or depressed to effect the same object.* Having focussed with great care, observe what part of some prominent object in the picture bisects the vertical pencil line on the focussing screen, then move the camera from right to left, and notice whether the same part of the object now occupies the same position as before; should a difference be noticed, insert the screw-head *m* into the hole of the box, near the right-hand front corner, and turn it either to the right or left until *one half* the error observed between the object noticed and the pencil line is removed; and if this is properly done, shifting the camera from side to side will not change the position of the picture on the ground glass. The flap *t* having been shut down, and the focussing screen removed, the back No. 1, containing a prepared plate, is pushed into its place so that the mark *v* on the back-holder *i* (Fig. 15) shall be opposite to a corresponding mark on the back. The camera is now drawn to the *right-hand side*, so that it occupies a position as shown in Fig. 15; the flap *t* is drawn up, and the lens-cap removed for the necessary time of exposure for the light to produce the required impression on the plate. When the required time has been given (of which more hereafter), the lens-cap is replaced, the back is pushed inwards to the fullest extent into the back-holder *t*, the camera is shifted to the *left-hand side* of the box, and the lens-cap is again removed for the same amount of time* as in taking the first picture.

When this time has elapsed, replace the lens-cap, shut down the flap *t*, and remove the back from the camera; but in doing so push in the sliding shutter with the right hand, as the left hand removes it from the camera, or a gleam of light will fall on the plate and spoil your picture. The vulcanized band is now replaced, (this having been previously removed to allow the back to fit into the back-holder,) and the plate in back No. 2 may be exposed to the same object in exactly the same manner, or retained until we arrive at some other object considered worthy of being pictured, and in this way we may proceed until the six plates have

* This is supposing the light remains the same during the two exposures. If any variation should take place, a longer time must be given to the picture taken in the dullest light.

been impressed. On reaching home, the next operation will be the development of the pictures; but this may be deferred for some days, if required, thus enabling us to take even a distant tour with plates prepared before leaving home, expose them during the journey, and leave the development until our return.

The time of exposure in the camera varies according to the intensity of the light, and the aperture and focal length of the lens; therefore, to give the exact time would be impossible, but as some little guide it may be mentioned, that with a Horne and Thornthwaite's Stereoscopic Lens of $4\frac{1}{2}$ in. focus and $\frac{3}{8}$ in. aperture, about half a minute will be required for each picture in the full sunshine of summer, three minutes in the sunshine of winter, about two minutes in the summer without sunshine, and ten minutes in winter; *but at all times expose for the deepest shades, as the high lights are but little liable to injury from over-exposure.*

## DEVELOPING THE IMAGE.

The plate, on being taken into the operating room, is placed on a levelling stand, and distilled or filtered rain-water poured over it for half a minute, so as completely to moisten the surface and remove any particles of adherent dust; then drain slightly, and pour over its surface gallic acid solution, so as to cover every part; allow this to remain on one minute, then drain off, and cover the plate with a mixture made by adding one drachm of silver developing solution to three drachms of gallic acid solution (made and filtered as before described). *Pour on and off repeatedly so as thoroughly to moisten every part of the plate*, then allow it to remain on the plate until the general outline of the picture appears. This generally occupies about one minute, although sometimes much longer. Now pour off the developing solution, and examine the plate to ascertain if any stains are apparent; should such be visible, they may be easily removed *at this stage* by carefully brushing the surface with a camel's-hair brush. When this is effected, again pour on the developing solution, and allow it to remain until the picture is fully brought out and the high lights are sufficiently intense. On this being accomplished, drain off and thoroughly wash with

water. The picture is now ready for the next operation—fixing the image.

Should the developing fluid become muddy, pour it off, well wash the plate, and continue the development with fresh solutions made as before; or should no appearance of the picture take place after three minutes' application of the developing mixture,* use equal parts of silver developing and gallic acid solutions. In general a good picture takes from a quarter to half an hour to develop, and the condition of the sky will serve to indicate whether the proper amount of exposure has been given. An under-exposed picture has a dense sky, but the details in the deep shades are deficient; whereas in an over-exposed picture the details are well out, but the sky is transparent and generally of a reddish tint; such pictures, moreover, possess no contrasts of light and shade; whereas when the proper amount of exposure has been given, the sky is perfectly opaque, the middle tints finely developed, and the details apparent in the deepest shades with perfect contrasts of light and shade. I cannot pass on to the next step without giving a caution against the use of imperfectly-cleaned measures and vessels to contain the developing fluid; these are constant causes of failure, and must be carefully avoided.

### FIXING THE IMAGE.

The plate, having been thoroughly freed from the developing fluid by washing, is placed on the levelling stand, and the surface covered with fixing solution. In a minute or two the yellow opalescent colour of the film will disappear; and when this occurs, well wash with water, and lean the plate against the wall to drain and dry. The surface, when dry, is sufficiently hard to resist any *slight* violence; but as a further protection, warm the plate slightly all over near a good fire, then pour over its surface Horne and Thornthwaite's Negative Varnish in the same manner

* If the temperature of the operating room is allowed to fall below 60°, the development proceeds more slowly, or even ceases altogether. In such cases heat the developing solutions to about 100°, and renew as often every five minutes until the picture is developed.

as collodion is applied. Allow the superfluous varnish to drain back into the bottle; hold the plate again before the fire until the whole of the spirit is evaporated, and, when cold, the plate is ready to be printed from so as to produce any number of positive pictures, either on paper or glass, as hereafter described.

A negative picture sometimes requires to be "touched," in order to give an increased opacity to the sky; this may be easily done with Indian ink, ground on a plate with water to which a few drops of albumen have been added.

## THE PRINTING PROCESS.

Before entering into the details of the next operation, it is necessary that the amateur should possess a clear idea of the meaning of the terms "positive" and "negative."

A positive picture may be defined to be a photograph giving a natural representation of the object it is intended to represent when viewed by reflected or transmitted light.

A negative picture, on the contrary, when viewed by reflected light, gives but an imperfect representation of the object from which it was taken, having the high lights of the picture obscure and of a brown colour, without any apparent definition of middle tints, or the lights and shades merging into one another with abruptness; but if viewed by transmitted light, the lights and shades are reversed—representing all the pure whites of the object by perfect blackness, the blacks by perfect transparency, and the middle tints of various gradations of tone in the same *inverse* order, according as the parts represented are more or less approaching the white or sombre shades.

A good negative, prepared as before described, may be used to produce an infinite number of positives, and the process for their production is termed "printing." These positives may either be on paper or glass; the former is viewed by reflected, and the latter by transmitted light.

It was first intended to have given the full details for the production of both glass and paper positives, but the evident superiority of the former has prejudiced me against the latter,

and as my experiments have never been turned to paper pictures, I must refer my readers for full information on printing paper positives to Thornthwaite's Guide to Photography, price 1s., first mentioning that good positive pictures on glass are by far the most pleasing, are easier of production, and admit of finer detail. They are also *more permanent* than those on paper. Another recommendation is, that glass positives may be as successfully printed by artificial as by day light, and require no extra solutions; the addition of a pressure frame to the articles used for negatives being all that is necessary.

### TO PRODUCE GLASS POSITIVES.

The pressure frame for printing glass positives consists of a wooden frame of the same internal measurement as the glass we employ for our negatives, and is furnished with a projected rim on which the negative may rest. A back-board, lined with cloth, also fits into the frame, which firmly presses the prepared plate against the negative when the cross bars are fastened down by their respective hooks.

To produce glass positives, close the door of the operating room, place the negative, *face upwards*, in the pressure frame, and on it, *face downwards*, lay a sensitive plate (*prepared precisely as described for taking negatives*); the back-board is then laid on the sensitive plate, and the cross bars fastened down, so as to bring the sensitive coating on the plate in direct contact with the negative; wrap up the pressure frame in the focussing cloth, open the door of the operating room, and all is ready for exposure. The direct rays of the sun are far too energetic for our purpose, therefore remove the focussing cloth, and expose the frame, face upwards, to the northern part of the sky, from two to ten seconds, according to the intensity of the light; then again cover up with the focussing cloth, return to the operating room, close the door, and proceed to develop and fix the image, as described at page 29. If the operator cannot conveniently make use of daylight for printing, place the pressure frame in front of, and six inches from, an argand oil lamp or gaslight, and allow it to remain undisturbed about five minutes; then proceed to the

development as before described. When these pictures are developed, fixed, and thoroughly dry, they may be mounted ready for viewing by the stereoscope in stereoscopic passe-partouts made for the purpose.

## CONCLUDING REMARKS.

It was my original intention to have published a modification of this dry process, which did not require the collodion film to be excited, prior to the application of the iodized albumen; but after three months' trial of that plan, I discovered that only a few samples of collodion answered the purpose.

The condition of a collodion that would ensure certain results remains to be investigated, and this I hope to do at some future period; in the meantime, it seems best to publish such a process as will answer with the materials now commonly sold.

It will be noticed that the method here given differs from the one I formerly published in some essentials; for instead of using fermented albumen, a recently prepared albumen with treacle is substituted; a much larger amount of glycerine and tincture iodine is added to the iodized collodion; instead of using two bath solutions, one to excite the collodion film, and the other the albumen, one only answers the purpose; and lastly, the development by pyrogallic acid has been displaced by the *slower but more certain agent*, gallic acid.

These changes have not been adopted with haste, but are the results of some months' experiments on this process. Much yet remains to be done to gain increased sensibility, and I look with confidence to the collodion film as the point where the alteration must be made; the more so, as the microscopic *appearance* of a collodion film yielding a sensitive plate differs materially from one less sensitive; and to the microscope, those who aim to improve this excellent process must turn their attention. I throw out this hint in the hope that others having more leisure at their command than falls to my lot, may be led to continue an investigation, which has not been totally profitless in my hands.

# HORNE & THORNTHWAITE'S

# CATALOGUE

OF THE APPARATUS AND MATERIALS FOR TAKING AND VIEWING

# STEREOSCOPIC PICTURES, &c.

## CAMERAS AND LENSES FOR STEREOSCOPIC PICTURES.

4500 STEREOSCOPIC CAMERA, fig. 1, mounted on base board, with parallel rulers, two camera backs, one for taking stereoscopic views of the usual size, and the other for taking portraits, 4¼ inches by 3¼ inches, and 3¼ inches by 2¾ inches, £3.

4501 Ditto fitted with one of HORNE & THORNTHWAITE'S best double combination portrait lenses, so arranged as to take both views or portraits, £6 10*s*.

4502 The above stereoscopic camera for taking views only, fitted with best stereoscopic view lens of 4¼ inches focus, mounted in brass, with rack and pinion adjustment, but without the camera back or screen for taking portraits, £4 7*s*.

4503 BOX STEREOSCOPIC CAMERA, fig. 8, made as described by Mr. Ackland at page 11, so arranged as to allow the operator to take six views without returning to his operating room, complete with camera back, holder, focussing screen, six camera backs, focussing eye piece, spirit level, view meter, and best 4¼ inches focus stereoscopic view lens, mounted in brass, with rack and pinion adjustment, £7 7*s*.

4504 Ditto fitted with both view and portrait lenses of the best construction, £11.

The stop placed over the back lens of the portrait combination is used when taking views, and must be removed when taking portraits.

4505 CAMERA STAND, fig. 4, light and steady, adapted for either of the foregoing cameras, with screw to fix the camera, £1 1*s.*

4506 STEREOSCOPIC PORTRAIT CAMERA with two lenses, £10 10*s.*

In this arrangement the two pictures are taken simultaneously, but the plate requires to be cut and the pictures transposed, before it can be viewed stereoscopically.

## LENSES FOR STEREOSCOPIC PICTURES.

4507 HORNE AND THORNTHWAITE'S PORTRAIT LENS, in handsome brass mounting, with rack and pinion adjustment, the lenses 1¾ inches in diameter, for taking portraits 4¼ inches by 3¼ inches and under, and having a moveable stop to be fitted over the back lenses, so as to enable it to be used for taking stereoscopic views, £3 13*s.* 6*d.*

4508 HORNE AND THORNTHWAITE'S STEREOSCOPIC VIEW LENS, 4¼ inches focus, 1⅓ inches diameter, mounted in brass, with rack and pinion adjustment, £1 15*s.*

4509 HORNE AND THORNTHWAITE'S LARGE ANGLE STEREOSCOPIC LENS, 3¾ inches focus, 1 inch diameter, mounted in brass, with rack and pinion adjustment, £2.

## DIPPING BATHS.

4510 DIPPING BATH of gutta percha, vertical form, fig. 10, of the size required to excite a stereoscopic plate, with glass dipper, 4*s.*

4511 DIPPING BATH of glass, horizontal form, flat bottom, fig. 9, adapted for either exciting the albumen coating, or for developing when the levelling stand is not used, 2*s.* 6*d.*

4512 SILVER WIRE HOOK, to be used with the horizontal dipping bath, 1*s.* 6*d.*

## GLASS PLATES.

4513 Best Patent Plate with ground edges, stereoscopic size, 6¾ inches by 3¼ inches, 3*s.* per dozen.

4514 Best Flatted Crown Glass, stereoscopic size, 1*s.* per dozen.

Patent Plate is recommended for use in taking negatives, but the flatted crown glass answers well for transparent positives.

4515 GLOBE PLATE HOLDER, fig. 11, 4*s.* 6*d.*

This form of holder is the best yet invented for use in the dry process.

4516 LEVELLING STAND, fig. 12, adapted for stereoscopic plates, 2*s.* 6*d.*

4517 GRADUATED GLASS MEASURE, two-ounce capacity, divided into drachms, 1*s.*

4518 Ditto ten-ounce capacity, cylindrical form, 2*s.*

4519 Ditto one-pint capacity, 3*s.* 4*d.*

4520 Stirring Rod, 6 inches long, 2*d.*

4521 Ditto, 9 inches long, 3*d.*

4522 BALANCE with steel beam, glass pans, and set of weights, from two drachms down to half a grain, in oak box, 5*s.* 9*d.*

4523 FUNNEL of glass, two inches diameter, 4*d.*

4524 Ditto of gutta percha, fitting outside the funnel 4523, 6*d.*

4525 CIRCULAR FILTERS in packets of 100, for the funnel 4523, 6*d.* per packet.

4526 FUNNEL of glass, 4 inches in diameter, 6*d.*

4527 CIRCULAR FILTERS in packets of 100, to fit the funnel 4526, 1*s.* per packet.

4527* FILTERING PAPER prepared free from iron or other impurities, 1*s.* per quire.

4528 DEVELOPING GLASSES, a set of three-nested, 1*s.* 6*d.*

4529 PRESSURE FRAME, for printing glass positives, fig. 13, 4*s.*

4530 Ditto for printing paper positives, 4*s.* 6*d.*

4531 CIRCULAR SPIRIT LEVEL, fig. 7, 3*s.*

4532 FOCUSSING EYE-PIECE, fig. 5, 3*s.*

4533 VIEW-METER, fig. 6, 2*s.*

## MOUNTS FOR STEREOSCOPIC PICTURES.

4534 CARDBOARD MOUNTS, for paper positive pictures, various shades, 6*d.* per dozen, 4*s.* per 100.

4535 Ditto, white ground, with gold line around each picture, 9*d.* per dozen, 6*s.* per 100.

4536 PASSE PARTOUTS, dark ground, with gold line, for mounting transparent or opaque positives on glass, 4*s.* per dozen.

4537 HORNE AND THORNTHWAITE'S ALBUMENIZED PAPER, for printing stereoscopic positives on paper in a very superior manner, yielding great depths of tone, and fine detail, size 11¼ by 9 inches, with directions for use, 2s. 9*d.* per quire.

4538 Ditto, 17½ inches by 11¼ inches, 5*s.* 6*d.* per quire.

4539 Ditto, 22½ inches by 17½, 11*s.* per quire.

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## COLLODIO-ALBUMEN PLATES,

*Sensitized ready for immediate use, or albumenized only, prepared under* MR. ACKLAND'S *superintendence.*

| | | Albumenized. | | | Sensitive. | | | * Mahogany Plate Boxes. Each. | | | Deal Plate Boxes. Each. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| 4552 | 6¾ by 3¼ (Stereoscopic size), per dozen— | 0 | 6 | 0 | 0 | 8 | 0 | 0 | 3 | 6 | 0 | 2 | 6 |
| 4553 | 3¼ „ 2¾ „ | 0 | 4 | 6 | 0 | 5 | 9 | 0 | 2 | 0 | 0 | 1 | 3 |
| 4554 | 4 „ 3 „ | 0 | 5 | 0 | 0 | 6 | 9 | 0 | 2 | 3 | 0 | 1 | 5 |
| 4555 | 5 „ 4 „ | 0 | 6 | 0 | 0 | 8 | 0 | 0 | 2 | 6 | 0 | 1 | 8 |
| 4556 | 6 „ 5 „ | 0 | 9 | 0 | 0 | 11 | 6 | 0 | 3 | 0 | 0 | 2 | 0 |
| 4557 | 7 „ 6 „ | 0 | 13 | 6 | 0 | 15 | 0 | 0 | 3 | 6 | 0 | 2 | 6 |
| 4558 | 8 „ 6 „ | 0 | 14 | 6 | 0 | 16 | 6 | 0 | 4 | 6 | 0 | 3 | 0 |
| 4559 | 8½ „ 6½ „ | 0 | 16 | 0 | 0 | 19 | 0 | 0 | 4 | 6 | 0 | 3 | 0 |
| 4560 | 9 „ 7 „ | 0 | 18 | 6 | 1 | 2 | 6 | 0 | 4 | 9 | 0 | 3 | 4 |
| 4561 | 10 „ 8 „ | 1 | 5 | 0 | 1 | 11 | 6 | 0 | 6 | 6 | 0 | 4 | 6 |
| 4562 | 12 „ 10 „ | 1 | 15 | 0 | 2 | 5 | 0 | 0 | 8 | 0 | 0 | 5 | 6 |

*Intermediate Sizes, not in this List, charged* 20 *per cent. more than the above Prices.*

* If sensitive plates are kept a long time in deal plate boxes, they become injured by the turpentine vapour given off by this wood; plate boxes of mahogany should therefore always be used.

## REFRACTING STEREOSCOPES.

4580 REFRACTING STEREOSCOPE, wood body, covered with imitation-leather paper, 2*s.* 10*d.*

4581 REFRACTING STEREOSCOPE, the body of polished mahogany, with brass eye-pieces, 6*s.*

4582 REFRACTING STEREOSCOPE, superior make, the body of polished mahogany, with brass eye-pieces, hinged flap, and glass bottom, 10*s.* 6*d.*

4583 Ditto, mounted on ornamental brass stand, capable of being raised, depressed, or inclined to any angle, so as to admit of the exhibition of stereoscopic pictures to a number of persons consecutively, without fear of any derangement of the instrument, £1 11*s.* 6*d.*

4584 REFRACTING PRISMATIC STEREOSCOPE, (see fig. on the cover) in mahogany body, 10*s.* 6*d.*

4585 Ditto, with stand, £1 11*s.* 6*d.*

4586 REFRACTING PRISMATIC STEREOSCOPE, in rosewood body, 14*s.*

4587 Ditto, on stand, £1 15*s.*

This form of stereoscope is infinitely superior to the old model, requiring no adjustment, and giving a more natural effect to the picture.

4590 PORTFOLIO STEREOSCOPE, handsomely made in Morocco leather, with gilt clasps, size when closed, 6 inches by 7½ in., and 1½ inches thick, £1 1*s.*

4591 POCKET STEREOSCOPE in cloth binding, size 7 inches by 4 inches, and ¾ inch thick, 2*s.* 6*d.*

4592 Ditto in Morocco leather, 5*s.*

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## STEREOSCOPIC PICTURES.

4598 STEREOSCOPIC PICTURES, on paper, taken by photography, embracing views taken from some of the most remarkable places in Europe, 10*d.*

4599 Ditto, of superior character, having finest detail, and taken by superior artists, 1*s.* 2*d.*

4600 TRANSPARENT STEREOSCOPIC PICTURES, on glass, taken from albumen or collodion negatives, 3*s.* 6*d.*

4601 Ditto, of a very superior character, having the minutest detail exquisitely represented, and the general picture artistically produced, 4*s.* 6*d.*

The value of stereoscopic pictures taken by photography depends so much on the minute detail being preserved, and the careful selection of such spots as afford artistic pictures, that the productions of superior artists always command a higher price than those of a mediocre character. This remark may tend to explain the variation in price of somewhat similar articles.

4601* Ditto Swiss and Italian views, carefully selected, 6*s.* 6*d.*

4604 MAHOGANY BOXES, to contain one dozen glass stereoscopic slides, 3*s.* 6*d.*

4605 Ditto to contain two dozen, 5*s.*

## SELECTIONS OF STEREOSCOPIC PICTURES.

4607 A selection of ten stereoscopic views on paper, and two on glass, 15*s.*

4608 A selection of ten stereoscopic views on paper, and four on glass, £1 1*s.*

4609 A selection of twelve stereoscopic views on paper, and six on glass, £1 11*s.* 6*d.*

4610 A selection of twelve best stereoscopic views on paper, and six on glass, embracing three of Swiss scenery, £2 2*s.*

4611 A selection of twelve best stereoscopic views on paper, and twenty-two on glass, four of which are Swiss scenery, in mahogany box, £5 5*s.*

## COMPLETE SETS OF APPARATUS FOR TAKING STEREOSCOPIC PICTURES.

4614 A complete set of photographic apparatus for taking stereoscopic views, including a box stereoscopic camera fitted with view lens, stand, dipping bath, glass plates, plate box, globe plate holder, levelling stand, measures, funnels, stirring rod, balance and set of weights, filters and filtering paper, developing glasses, pressure frame, level, focussing eye piece, view meter, and all the necessary chemicals packed for home use or travelling, £12 12*s.*

4615 Ditto fitted with both portrait and view lenses, £16 5*s.*

# CHEMICALS

## REQUIRED FOR USE IN THE COLLODIO-ALBUMEN PROCESS, AND FOR PRINTING PAPER POSITIVES.

Acid, acetic, glacial, 6*d.* per ounce.

„ gallic, 1*s.* per ounce.

Ammonium, iodide, 2 drachms, in bottle, 2*s.*

The success of the Collodio-Albumen process depends much on the quality of this chemical.

Collodion, negative, 7*d.* per ounce, 11*s.* 6*d.* per pint.

„ iodizing solution for ditto, 7*d.* per ounce, 11*s.* 6*d.* per pint.

Ether, sulphuric, rectified, 5*d.* per ounce.

Glycerine, pure, 6*d.* per ounce.

Gold, chloride solution, containing one grain of chloride of gold to one drachm of solution, 1*s.* 6*d.* per ounce.

Iodine, pure, 1*s.* 6*d.* per ounce.

„ tincture, 6*d.* per ounce.

Kaolin, prepared, 3*d.* per ounce.

Potassium, cyanide, 3*d.* per ounce.

Nitrate of silver, pure, re-crystallised, and fused, 4*s.* 6*d.* per ounce.

*King's College, Feb. 13th,* 1857.

I have examined the fused Nitrate of Silver manufactured in flat Cakes by Messrs. Horne and Thornthwaite. It is a very pure article, and contains the correct proportion of Silver; as a Photographic agent it produces a high degree of sensitiveness, gives clean and intense negatives, and is much superior to the commercial crystallized Nitrate of Silver, for Photographic purposes.

(*Signed*) F. HARDWICH.

Soda, hyposulphite, 1*d.* per ounce, 8*d.* per pound.

Tripoli, prepared, 3*d.* per ounce.

Varnish, negative, 1*s.* 6*d.* per 4 ounce bottle.

Water, distilled, 6*d.* per gallon.

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*** *For a complete List of Photographic Apparatus and Chemicals, see* HORNE & THORNTHWAITE'S *Photographic Catalogue.*

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